# AIPSLETTER

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A newsletter for users of the NRAO
*Astronomical Image Processing System*

Written by a cast of *AIPS*

Edited by
Eric W. Greisen
National Radio Astronomy Observatory
P.O. Box O, Socorro, NM 87801–0387
505–835–7236; Fax 505–835–7027
`daip@nrao.edu`
`http://www.aips.nrao.edu/`

## General developments in *AIPS*

### Current and future releases

We have formal *AIPS* releases on an annual basis. While we offer a full binary installation method for both the frozen and development versions for MacIntosh OS/X (PPC and Intel chips), Solaris, and Linux systems, all architectures can do a full installation from the source files. The current release is called `31DEC08` and is now "frozen." If you took a development copy of this version at some earlier date, you should use the "Midnight Job" (MNJ) to bring it up to date. You need to run a MNJ only once in 2009 to convert your copy of `31DEC08` into the frozen version. When patches to `31DEC08` are announced, you may apply them with the MNJ. This *AIPSLetter* is intended to advise you of corrections and improvements in this release.

We have begun a new version, called `31DEC09`, which is now under development by the *AIPS* Group. You may fetch and install a complete copy of this version at any time. Having fetched `31DEC09`, you may update your installation whenever you want by running the MNJ. This uses cvs, rsync, and/or transaction files to copy and compile the code selectively based on the code changes and compilations we have done. We expect users to take their source-only or binary version of `31DEC09` *AIPS* over the Internet (via *anonymous* ftp). Both versions require you to copy the installation procedure `install.pl` via `ftp`; the source-only version also requires you to ftp the 90-Mbyte `31DEC09.tar.gz` compressed tar file. Linux sites will almost certainly have `cvs` installed; other sites may have installed it along with other GNU tools. Secondary MNJs will still be possible using `ssh` or `rcp` or NFS as with previous releases. We have found that `cvs` works very well, although it has one quirk. If a site modifies a file locally but in an *AIPS*-standard directory, `cvs` will detect the modification and attempt to reconcile the local version with the NRAO-supplied version. This usually produces a file that will not compile or run as intended.

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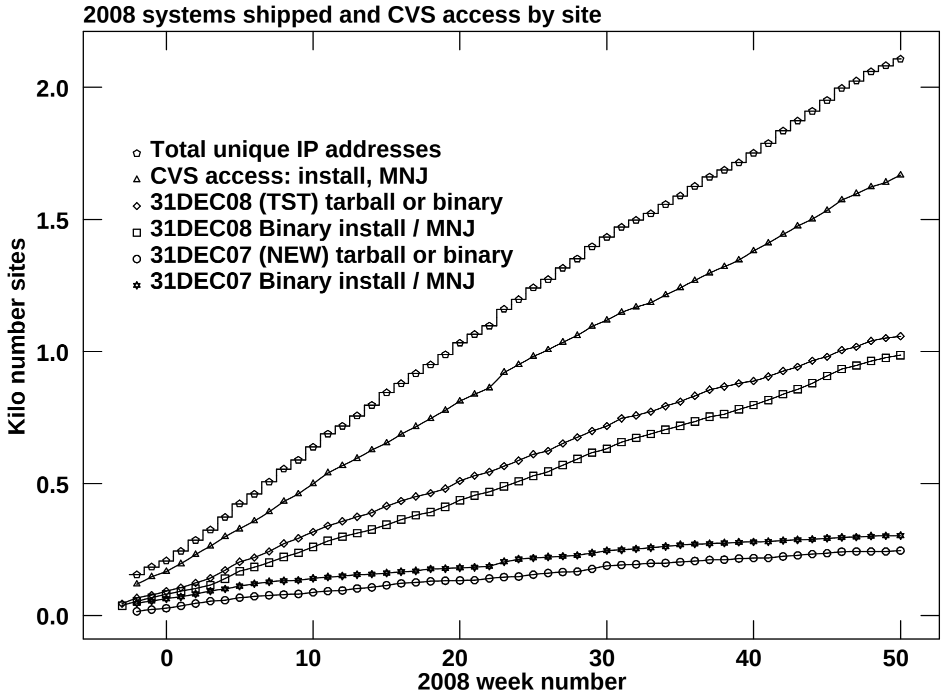
### Installing a new version

If compiling locally, new releases must be installed from the tar ball for that release. If using the binary installation, a full new installation must also be done with `rsync`. The `cvs` system requires this. When installing a new *AIPS* release in a system that already has a previous release, we recommend that `install.pl` be used and that the previous release be left in place, at least until the installation has been seen to work. If you do this, then you will not have to re-edit the disk, printer, and tape lists and can simply skip all those pages in the `install.pl` menus. The old `$HOME/.AIPSRC` file may be left in place, but it will need to be edited. The lines giving the `DOWNLOADED` and `UNPACKED` parameters should be cleared and the `CCOMOPT` line should be changed to point to the current release rather than the previous one — the `-I` parameter really should be `-I$INC` but it gets its full path name instead. This forces a re-edit with each release. If you have made special versions of `UPDCONFIG` and `do_daily.`*host*, you should preserve them under new names and restore them after the install. If you have an odd set of *AIPS* versions, the `$AIPS_ROOT/AIPSPATH.*SH` files may need to be edited after the install to set the desired versions.

For Linux, Solaris Ultra, and MacIntosh systems, a binary installation could be available from DVD, supported by `install.pl`. Alternatively, the frozen version may be installed with the binary installation method now present in `install.pl`. The ftp site for downloading files directly has been eliminated.

## *AIPS* Distribution

We are now able to log apparent MNJ accesses, downloads of the tar balls and `rsync` accesses. We count these by unique IP address. Since DSL and some university and other connections may be assigned different IP addresses at different times, this will be a bit of an over-estimate of actual sites. However, a single IP address is often used to provide *AIPS* to a number of computers, so these numbers are at the same time an under-estimate of the number of computers running current versions of *AIPS*. In 2008, a total of 246 different IP addresses downloaded the frozen form of `31DEC07` and 1058 IP addresses downloaded `31DEC08` in tarball or binary form. Fully 1667 IP addresses accessed the NRAO cvs master. Each of these has at least installed `31DEC08` and 429 appear to have run the MNJ at least occasionally. The total number of unique IP addresses in these three lists was 2107. 303 sites accessed `31DEC07` in binary form, while 986 sites used the binary form of `31DEC08`. The attached figure shows the cumulative number of unique sites, cvs access sites, tar-ball/binary download sites and binary access sites known to us as a function of week in 2008. These numbers represent substantial increases over those for 2007.



Since the registration system, always under-utilized, has now been abandoned, we are left with analysis by IP address. The table below lists the IP addresses for 2008 by the final qualifier for shipments of `31DEC08`, `31DEC07`, and access to the cvs site. The numbers in the cvs column include those sites that install or run a midnight job for these releases. The comments come from what appears to be a semi-official list of Internet codes. Sorting is on the "unique" column, which counts unique IP addresses over the other three columns:

| Code | `31DEC07` | `31DEC08` | cvs site | unique | Comments |
|---|---:|---:|---:|---:|---|
| net | 14 | 106 | 492 | 543 | Network |
| edu | 33 | 221 | 296 | 368 | US Educational |
| uk | 7 | 64 | 63 | 85 | United Kingdom |
| de | 4 | 38 | 63 | 75 | Germany |
| jp | 18 | 55 | 58 | 74 | Japan |
| in | 22 | 29 | 51 | 64 | India |
| com | 12 | 31 | 38 | 56 | US Commercial |
| es | 5 | 27 | 45 | 49 | Spain |
| ca | 3 | 19 | 26 | 35 | Canada |
| it | 4 | 27 | 32 | 35 | Italy |
| au | 3 | 22 | 19 | 34 | Australia |
| org | 2 | 19 | 27 | 32 | Non-Profit Organization |
| nl | 7 | 21 | 20 | 31 | Netherlands |
| za | 7 | 11 | 12 | 24 | South Africa |
| pl | 7 | 6 | 18 | 24 | Poland |
| ru | 5 | 13 | 7 | 18 | Russian Federation |
| mx | 2 | 11 | 6 | 14 | Mexico |
| gov | 2 | 7 | 8 | 10 | US Government |
| ar | 4 | 4 | 6 | 10 | Argentina |
| fr | 1 | 8 | 3 | 9 | France |
| tw | 2 | 6 | 7 | 8 | Taiwan |
| br | 3 | 5 | 4 | 8 | Brazil |
| mil | 0 | 5 | 7 | 8 | US Military |
| hu | 4 | 3 | 1 | 7 | Hungary |
| ch | 0 | 5 | 3 | 6 | Switzerland |
| se | 0 | 4 | 4 | 6 | Sweden |
| ie | 1 | 3 | 4 | 5 | Ireland |
| be | 2 | 2 | 3 | 5 | Belgium |
| pt | 0 | 2 | 4 | 5 | Portugal |
| fi | 0 | 4 | 3 | 4 | Finland |
| at | 1 | 3 | 3 | 3 | Austria |
| dk | 0 | 2 | 1 | 2 | Denmark |
| gr | 0 | 2 | 1 | 2 | Greece |
| th | 0 | 2 | 0 | 2 | Thailand |
| kr | 0 | 2 | 1 | 2 | Korea (South) |
| il | 0 | 1 | 1 | 1 | Israel |
| yu | 0 | 1 | 0 | 1 | Yugoslavia |
| my | 0 | 1 | 0 | 1 | Malaysia |
| bo | 0 | 1 | 0 | 1 | Bolivia |
| lt | 0 | 1 | 0 | 1 | Lithuania |
| eg | 0 | 1 | 0 | 1 | Egypt |
| cx | 0 | 1 | 0 | 1 | Christmas Island |
| no | 0 | 1 | 0 | 1 | Norway |
| ua | 0 | 1 | 0 | 1 | Ukraine |
| cl | 0 | 0 | 1 | 1 | Chile |
| None | 2 | 8 | 6 | 12 | |
| Unknown | 69 | 252 | 323 | 422 | |
| Total | 246 | 1058 | 1667 | 2107 | |

# Preview of coming attractions

The 31DEC09 release already contains a few minor changes that we decided were a bit risky or not needed in 31DEC08. TIMDEST has been disabled and RENUMBER can now renumber files to slot numbers higher than any present in the current catalog. TAB characters should be removed on input more fully. The position of the North Pole will be expressed in arc seconds, not meters, a decision enforced by the fundamental routine ANTINI. UVFIX will handle both units properly in 31DEC08.

# Improvements of interest to users in 31DEC08

We expect to continue publishing the *AIPSLetter* every six months along with the annual releases. Compared to the first half of this year, there have been only modest changes made to *AIPS* in the second half of the year. New verbs include ASIN, ACOS, and SIZEFILE, the last to assist in controlling the "array-processor" size with SETMAXAP. The last of the basic amplitude calibrator models, 3C147 at C and X bands, have been added to the system. IMAGR was changed to reduce disk I/O where possible, imaging more than one facet for each read through the data. This is a continuation of the major changes in model computation made earlier this year, also in an effort to reduce disk I/O which has become a major bottleneck. During the first half of 2008, the *AIPS* TV was enhanced to support more image planes and a wider dynamic range, use of VLA on-line flag information was enhanced, and procedures to handle the temporary aliasing problem on EVLA-EVLA baselines were introduced.

31DEC08 contains major changes to the display software. Older versions may use the 31DEC08 display (XAS), but 31DEC08 code may not use older versions of XAS. 31DEC04 through 31DEC09 use a new numbering scheme for magnetic tape logical unit numbers that is incompatible with previous versions. Thus all tape tasks and the server TPMON must be from a recent release. Other than these issues, 31DEC08 is compatible in all major ways with the with the 15OCT98 and later releases. There are significant incompatibilities with older versions. Note that the only version which we patch for major errors is 31DEC08; even 31DEC07 is no longer changed.

## UV data input/output

### FILLM

FILLM, the task that translates VLA on-line data into *AIPS*, was changed quite a bit during the first half of 2008; see the June 30 *AIPSLetter* and the patches list elsewhere in this *AIPSLetter*. FILLM has confused which IF goes with which in applying on-line flags for modes 2BC, 2CD, 4, PA, and PB. This led to some data being flagged that should not have been and other data being left unflagged erroneously. FILLM treated DOUVCOMP = 0 as true, which is very non-standard for *AIPS* logical adverbs; it was changed to be false. A revised on-line format has made the actual receiver ID available to FILLM. This has allowed bands to be defined better, but caused an error in the period September 12 to October 20. During that time, a change of band could cause the last CL table entry for the previous band to have opacity and gain corrections appropriate to the new band. The flagging of data for shadowing has been implemented incorrectly in the on-line system in the post-ModComp (after June 27, 2007) era. The subroutine that computes flagging in FILLM was corrected for a nasty typo and then made the default for shadowing for data from the post-ModComp era. Note that the nasty typo only affected computation of shadowing using a limit other than 25.0 meters, but that the on-line bug affected all recent data. Shadowing is of course only important in the D configuration. FILLM was also changed to determine the configuration for itself, for purposes of writing it in the history file.

### FITLD and FITS-IDI

A couple of bugs in the transfer of clock and atmosphere corrections and the geometric delay polynomial from the MC and IM tables to the CL table were found. The first arose when there was more than one *uv* table in a correlator file, a circumstance which seems moderately common. In that case, the update of the CL table was attempted only for the range of times of the last *uv* table of the file. The other arose when IM and MC tables are the same size from correlator file to correlator file. In that case, the hash tables were not re-initialized and so the desired data of the later files was not found. Both of these bugs were corrected July 28 in 31DEC08 only. These parameters are not widely used in *AIPS*, but they are updated by DELZN and are quite relevant to data sets taken from *AIPS* to astrometric packages. If the first CL table from FITLD has to be replaced by INDXR due to subarray or data ordering conditions, then these bugs are fully corrected.

The FITS-IDI convention layered upon the FITS Format has been widely used for data from VLBI correlators including the VLBA. This convention has been reviewed recently for consideration as an internationally accepted convention. During that review a number of errors and omissions in previous documentation were uncovered and corrected. We wish to encourage all interested parties to review this document and to send any suggestions and corrections to egreisen@nrao.edu. The document may be found at http://www.aoc.nrao.edu/∼egreisen/AM113.pdf. FITLD has received several revisions to support these corrections. The new CORRELAT keyword is now used a bit more extensively.

## Calibration and editing

**VBGLU** was corrected for an error in which data that were not in strict TB order could have a wrong baseline's data written into the output. *The error was present starting in August 2006 and all uses of* VBGLU *since then should be re-done.* Errors affecting the gluing of AT and CQ tables were also corrected.

**3C147** models at C and X bands have been added to the system. These are available to all releases if one runs a MNJ.

**3C48** model at X band has caused high rates of closure error on long baselines. A single data set dominated that model and seems to be the mysterious source of the difficulties. A revised model was released.

**UVFLG** was changed to make opcode 'UFLG' more restrictive but with "I don't care about this one" values allowed for almost all adverbs. The opcode 'REAS' was reinstated to allow un-flagging based on REASON alone. A new opcode 'WILD' was added to un-flag on REASON with wild-card characters allowed in the adverb.

**Modeling** with images works well if the images are suitable, *i.e.*, not convolved Clean images. The code was corrected to handle off-set sub-images correctly.

**Clean** component files may be found with *uv* data sets as well as images. The modeling software as well as PRTCC and VPLOT were corrected for image-centric assumptions.

**UVCOP** was changed to allow flagging of TY and/or SN tables when a flag table is being applied to the *uv* data.

**Nasmyth** antenna mounts require some changes to code, primarily in parallactic angle computation. Richard Dodson has provided us with those corrections.

**CALIB** was corrected to avoid time inaccuracies which caused it to try to read past the end of index tables. The averaging was changed to avoid unfortunate alignments between fixed intervals and the actual data. The setting of the scaling factor in models was corrected to use only facet one and to apply the desired radius to each of the standard amplitude calibration sources.

**BPASS** now includes the option of an amplitude-only BP function.

**FXALIAS** and FIXAL were enhanced to allow more control over what is and isn't averaged in solving for and correcting the aliasing of EVLA-EVLA baselines in the old correlator. Defaults were changed to average over very little.

**UV2MS** was changed to allow full calibration adverbs to be applied to the input data set.

**EDITR** and EDITA were upgraded to apply a pre-existing FC table to the data prior to the first display, to keep track of source number when only one source is being edited, and to handle AREA flagging more proficiently.

**PHSRF** was given the full set of calibration and data selection adverbs. This task, which re-references spectral-line data sets, was corrected to work properly for data with more than one IF or polarization.

## Imaging and analysis

**IMAGR** was changed to grid multiple facet images and beams with one read through the *uv* work file when making the initial images and to re-image several facets with one read when looking for the next strongest in `OVERLAP=2` mode. It will now allow a specification in `BOXFILE` of no Clean boxes for a facet. The option to delete "weak, isolated" Clean components is run when requested as the Cleaning is about to end, but Clean now tries to continue for a while afterward in case the deletion makes a difference in the ending criteria.

**SIZEFILE** is a new verb to return the size of a file in Mbytes. This information may be of use when running `SETMAXAP` to control the upper limit to the "array processor" memory size used by AIPS tasks.

**CCRES** was changed to control scaling of the residual image, with the default being to correct to the new beam area. It now uses a careful counting of beam area for smallish beams and supports new opcodes `'ADDP'` and `'S+AP'` to put the components back as 1-pixel points.

**SETFC** was made to reduce the allowed phase error when the zenith angle is large or the average $|w|$ is comparable to $w_{\mathrm{max}}$. The default phase error was also reduced — all because it was noted that for southerly fields it was encouraging users to use facets that were way too large. It may now err on the side of smallish facets.

**FIXBX** now discards all boxes in the input `BOXFILE` even if the new `INFILE` has no boxes for the particular facet. The output gets a default inscribed circle if no boxes whatever are found for a facet.

**COMB** was given the adverb `DOHIST` to suppress some or all copying of the input history files to the output file.

**UVMOD** was given the full set of calibration and data selection adverbs.

**SHIFT** is now always done as arc seconds from the reference position. `FRPLT`, `UVLSF` and `UVLIN` were corrected to do this and to use correct frequencies in the phase shifting. A variety of help files were improved to be more explicit about shifting and to be correct in the usage.

## Plotting

**UVPLT** was corrected to plot log base 10 amplitudes when plotting log and to allow limits on $w$ when plotting the visibility sampling ($u$ and $v$ as the two axes).

**POSSM** was fixed to handle `SOLINT` intervals with no data gracefully and to plot log of amplitude under `CODETYPE`s `'LA&P'` and `'LAMP'`.

**DFTPL** was corrected to do phase shifting properly (it was rather seriously wrong) and to fetch the data of the requested channel (it was using only channel 1 data previously).

## Miscellaneous

**ASIN** and `ACOS` are new verbs that return the arc sine and arc cosine in degrees.

**New** adverb names have appeared in many tasks to alleviate the overuse of `INFILE` and `OUTFILE`. These include `DATAIN` and `DATAOUT` for FITS readers and writers plus `FILLM`. `INTEXT` and `OUTTEXT` appear in tasks that write miscellaneous information such as `IMEAN` and `POSSM`. `CALIN` is used to provide input calibration data to `APCAL`, `ANCAL`, and `FILLM`. `FITOUT` is used for output from fitting tasks such as `SAD`.

**Header** keywords are now copied in whole or in part from the input files to the output files. Many tasks ignored these previously.

**CookBook** files were updated for the new adverb names, `UVFLG` unflagging options, `UVCOP` flagging options, new capabilities of `XAS`, etc.

**Sorting** of tables was given a new method to use when the rows are rather long. It sorts in RAM the keys with an input record number and then does a gather read while writing the output table.

## Patch Distribution for `31DEC07`

As before, important bug fixes and selected improvements in `31DEC07` and `31DEC08` can be downloaded via the Web beginning at:

`http://www.aoc.nrao.edu/aips/patch.html`

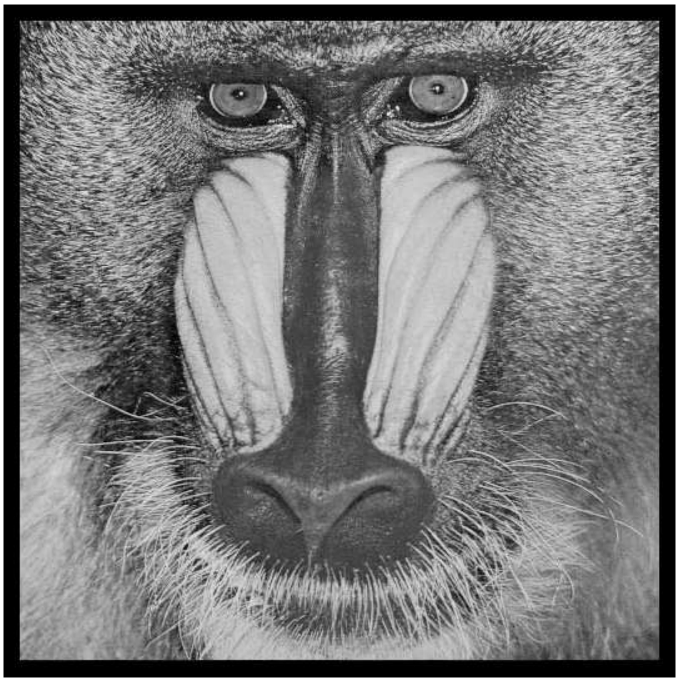
Alternatively one can use *anonymous* `ftp` to the NRAO server `ftp.aoc.nrao.edu`. Documentation about patches to a release is placed on this site at `pub/software/aips/`*release-name* and the code is placed in suitable sub-directories below this. As bugs in `31DEC09` are found, they are simply corrected since `31DEC09` remains under development. Corrections and additions are made with a midnight job rather than with manual patches.

The patch system has changed because we now have binary installations. We now actually patch the master copy of the frozen version. This means that a MNJ run on `31DEC07` after the patches listed below will fetch the corrected code and/or binaries rather than failing. Similarly, patches announced for `31DEC08` during the next year will be available via MNJ as well as `ftp`. Installations of `31DEC07` and `31DEC08` after the patch date will contain the corrected code.

The `31DEC07` release is no longer available for installation and will no longer receive patches even for egregious errors. It had a number of important patches during 2008. They are

1. `REBYTE` did not handle tables with long rows (`IM` and possibly `BP`) correctly *2008-01-09*
2. `FITLD` did not translate `WX` (weather) tables correctly *2008-01-18*
3. `DFT` model division did not set weights correctly *2008-03-05*
4. `FILLM` did not scale and weight cross-hand data for some baselines correctly *2008-03-05*
5. `VISDFT` did not do multi-scale model division and subtraction correctly *2008-04-29*
6. `FILLM` did not set the `CORRCOEF` keyword correctly for recent data *2008-06-19*
7. `FILLM` did not apply on-line flags correctly in modes 4, PA, PB, 2BC, and 2BD *2008-07-08*
8. `GO` verb limited the usage of `GPOS` and `FPOS` to less than some tasks require *2008-08-13*
9. `FACSET` used the wrong source radius primarily for 3C286, getting the wrong CC flux and model scaling parameter *2008-09-10*
10. The Mac OS/X version "leopard" requires changes to `XAS` and procedures `START_AIPS` and `START_TVSERVERS` *2008-09-26*
11. `FILLM` did not compute the shadowing test properly *2008-11-18*

Patches for versions older than `31DEC07` remain available from the web site, but only for hand insatllation with local compilation. The binary download site and our working systems contain only `31DEC07` and more recent releases. We are unable to offer significant support for older releases.



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*AIPSLETTER*
National Radio Astronomy Observatory
Post Office Box O
Socorro, NM 87801-0387
USA